***Teacher Notes – KEY***

**CW#72H:** Complex Perimeter Honors Geometry

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| **CRS** | MEA 601 - Use relationships involving area, perimeter, and volume to compute another measure |
| **Objective** | 12.1 Given information about area, find volume and vice versa  12.2 Given area of a geometric figure, find possible perimeters and vice versa  12.3 Given perimeter/side lengths of a geometric figure, find perimeter/side lengths of another geometric figure |

**Review**

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| **Formula** | **Triangles** | **Quadrilaterals** | **Circles** |
| **Perimeter** | **Add up sides**  **For missing sides:**  **\*Pythagorean Theorem**  **\*45-45-90 triangles**  **\*30-60-90 triangles** | **Square: 4x**  **Rectangle:**  **P = 2L + 2W** | **C = 2r**  **C = d** |
| **Area** | **A = bh** | **A=bh**  **\*Surface area:**  **Add up individual areas of each side (3D shape)** | **A=** |
| **Volume** |  | **Volume of a basic prism: V=bwh** |  |

**Exploration:** Given a fixed perimeter, how can we maximize and minimize area?

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| 1) Given a perimeter of 36 units, create at least 3 quadrilaterals that yield different areas.   1. What dimensions **minimize** area? 2. What dimensions **maximize** area?   **\*Given a fixed perimeter, a square maximizes area.** |

**I. Area** 🡪 **Perimeter, Perimeter** 🡪 **Area**

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| **Example 1:**  Jesus has 400 feet of fence for a rectangular backyard play area for his dog. What is the largest area Jesus can have for his dog’s play area? | **Practice 1:**  Daisy plans to build a pen for her pet rabbit. What is the area of the largest rectangular pen that she can make with 28 feet of fencing? |
| **Example 2:**  A farmer who owned a 20-yard-by-40-yard plot of land purchased more property such that the area doubled. The 40-yard length of the plot increased by 10 yards. How much must the 20-yard width have increased? | **Practice 2:**  An outdoor pool is 15-feet-by-10-feet. The owners want to double the size of the pool, extending the previous 10-foot width by 2 feet. How many feet will the length of the pool extend? |

**II. Area 🡪 Volume, Volume 🡪 Area**

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| **Example 3:**  If the full surface area of a cube is 600 in2, what is its volume? | **Practice 3:**  If the volume of a cube is 64 ft3, what is the area of one face of the cube? |

**III. Perimeter/Side of Geometric Figure 🡪 Other Geometric Figure**

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| **Example 4:**  A square and a semicircular region have the same perimeter. If the length of the radius of the semicircular region is 8, what is the length of one side of the square?  Exact answer: Approximate answer: | **Practice 4:**  A square and a semicircular region have the same perimeter. If the perimeter of the square is 16 in, what is the length of the radius of the circle?  Exact answer: Approximate answer: |
| **Example 5:**  The diameter of a circle and the hypotenuse of an isosceles right triangle have the same length. What is the circumference of the circle if the length of one of the legs of the isosceles right triangle is 7 in.  Exact answer: Approximate answer: | **Practice 5:**  The circumference of a circle and the perimeter of an equilateral triangle are the same. If the radius of the circle is 4 cm, what is the length of the side of the triangle?  Exact answer: Approximate answer: |

**Independent Practice**

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| 1) Which what is a maximized area of a quadrilateral with a fixed perimeter of 24 units? | 2) The short leg in a 30-60-90 has the same length as one side of a square. If the long leg is 6 ft long, what is the area of the square? |
| 3) A square and a circle share have the same perimeter. If the length of the diameter of the circle is 12 inches, what is the length of one of the sides of the square? Give an exact and approximate answer. | 4) The volume of a cube is 729 cubic inches.   1. What is the area of one face of the cube? 2. What is the full surface area of the cube? |
| 5) After remodeling, a square bedroom in a house is going to double in size. If the bedroom’s perimeter is initially 40 feet, what will the new area of the bedroom be? | 6) A plot of land is 6-acres-by-4-acres. With new ownership, this plot of land is set to increase by 4 times. If the 6-acre side of the plot increased by 2 acres, by how much did the 4-acre side increase? |
| 7) A 162 cubic centimeter prism has a 6 cm length and 9 cm height. What is the width? | 8) If the volume of a cube is 512 ft3, what is the area of one face of the cube? |
| 9) A square and a right triangle share the same perimeter. The right triangle has a 26 cm hypotenuse and a 10 cm leg. What is the length of one of one side of the square? | 10) A rectangle and a square have the same perimeter. If one side of the square is 6 inches, and the length of the rectangle is 4 inches, what is the width of the rectangle? |

**Exit Slip**

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| 1) The volume of a cube is 64 inches cubed.   1. What is the area of one face of the cube? 2. What is the full surface area of the cube? | |
| 2) An 8-foot-by-4-foot garden space is increased by 3 times. If the 8-foot side is increased by 4 feet, how many feet must the 4-foot side have been increased? | 3) A square and a semicircular region have the same perimeter. If the length of the radius of the semicircular region is 16, what is the length of one side of the square? |

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